Parental Growth Media Of Siberian Diamonds – Relation To Kimberlites

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Microinclusions in natural diamonds represent a bulk sample of fluids/melts from which they crystallized [1], and provide a unique opportunity to characterize diamond-forming media and to understand their origin and evolution. In comparison with the worldwide database, the parental fluids/melts in Siberian diamonds (fibrous, cloudy, coated) define a continuous range of carbonatitic to silicic compositions; only a few fall into the first half of the range from carbonatitic to saline. Several individual diamonds show core to rim variations from carbonatitic to silicic or vice versa, or from chloride-carbonate to predominantly carbonatitic.

The trace-element patterns of the microinclusions are generally similar to those of kimberlites and carbonatites, but there are significant differences in major elements. The relative abundance of K in the fluids is significantly higher than observed in the host kimberlite and carbonatites. The pattern of HFSE in the microinclusions shows some depletion in Ti, Zr and Hf. The REE pattern reveals low abundances of the heavy REE and high light REE concentrations. Many samples with carbonatitic composition have a negative anomaly in Y.

These studies have revealed that there are many geochemical features consistent with a genetic link between the diamond-forming media and ephemeral carbonatitic and silicic liquids (HDF's) which may be precursors of the host kimberlite. These HDF's may originate either from the metasomatic influx of volatile agents; some may be liberated by low-degree partial melting of eclogites and peridotites. The absence of any marked correlation of $\delta^{13}C$ of diamonds with the compositions of their microinclusions suggests that carbon-isotope compositions are generally related to the primary source of diamond-forming HDF's. Some elemental variations may be explained by the fractional crystallization of such fluids/melts, or mixing between liquids with different compositions.

[1] Navon *et al.* (1988) *Nature*. **335**, 784-789.

Bioreduction Of Sb-Substitued Goethite :A Mechanism Of Sb Mobility And Bioavailability?

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Antimony (Sb) is the ninth most mined metal for industrial uses worldwide. It is frequently used in a variety of industrial products although Sb and its compounds are considered as pollutants of priority interest. Due to their large surface area and reactive surface properties, iron oxide can be important sorbents of antimony (Sb). The incorporation of Sb into synthetic and natural iron oxides has been demonstrated [1]. However, extensive research is still required to evaluate whether the co-precipitation of antimony with iron oxide can serve as a possible long-term sink.

The aim of this work was therefore to synthesize Sb substituted goethite and to analyze the mobilization of Sb during the bioreduction process by *Shewanella puterfaciens* MR-1, an iron respiring bacteria. Additionally, the bioavailibilty of Sb was assessed using a whole cell GFP-based bacterial biosensor. Depending on the synthesis pathway, our data show that up to 1% of antimony can be substituted in the goethite structure affecting the coherence domain size of the mineral. The modification of the coherence domain size affects in turn the goethite's bioreduction and the bioavailibilty of Sb.

[1] Mitsunobu, S., *et al.* (2010): EST, 44, 3712-3718.

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